Remarks

In view of the above amendments and the following remarks, reconsideration and further examination are requested.

The Applicants would like to thank the Examiner for conducting the personal interview on September 1, 2004. During the interview, the claims were discussed in light of the Kleider reference, which was relied upon in the rejections of the outstanding Office Action. Although agreement was not reached, the interview was helpful in clarifying the issues.

Claims 1-7, 10, 11, 14, 19, 26 and 28 have been rejected under 35 U.S.C. §102(e) as being anticipated by Kleider (US 6,487,252). Claims 12, 13 and 25 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Kleider.

Claims 8, 9, 15-18, 20-24 and 27 have been indicated as containing allowable subject matter. The Applicants would like to thank the Examiner for this indication of allowable subject matter.

Claims 18, 20 and 24 have been amended so as to include the limitations of their respective base claims. As a result, claims 18 and 20-24 should now be allowed.

Claims 1, 12, 14, 19, 26 and 28 have been amended to make a number of editorial revisions. These revisions have been made to place the claims in better U.S. form. None of these amendments have been made to narrow the scope of protection of the claims, nor to address issues related to patentability and therefore, these amendments should not be construed as limiting the scope of equivalents of the claimed features offered by the Doctrine of Equivalents.

Claims 29-33 have been added.

The above-mentioned rejections are respectfully traversed and submitted to be inapplicable to the claims for the following reasons.

Claim 1 is patentable over Kleider, since claim 1 recites a method for transmitting an OFDM signal, wherein the OFDM signal includes at least one data symbol having only a plurality of subcarriers having data therein, and at least one pilot symbol including a plurality of subcarriers, at least one of the subcarriers having a frequency component predetermined in amplitude and phase, the method including, in part, inserting the pilot

symbol either before or after one or more data symbols. Kleider fails to disclose or suggest an OFDM signal as recited in claim 1.

Kleider discloses an OFDM system that provides improved time and frequency synchronization by inserting an unevenly spaced pilot sequence within constellation data. In the system, a pilot sequence generator 18 determines the pilot sequence overhead as a percentage of available frequency bins that will be occupied by pilot sequence tones (102). Further, the pilot sequence overhead is generally dependent on the desired synchronization performance at the receiver and can be anywhere from 0.01% to 100% depending on the situation. The pilot sequence generator 18 then determines a number of pilot signals that are needed by multiplying the pilot sequence overhead percentage by a number of sub-channels (104) and generates a sequence of that length (106). The number of pilot signals will correspond to a length of a pseudo-noise sequence used to generate the pilot tones. Maximal length sequences or any suitable pseudo-noise (PN) sequence may be used for the pilot sequence. The pilot sequence generator 18 then assigns the generated pilot tones to frequency bins based on a frequency bin assignment table 110 (112). In other words, the pilot sequence generator 18 intermittently inserts pilot tones of a pilot sequence 54 between constellation data 52 along a frequency axis such that there is an unequal spacing between each pilot tone. (See column 3, lines 6-67, column 5, lines 31-40, column 6, lines 4-7, and Figures 1, 2 and 5).

As discussed above, the OFDM system of Kleider inserts individual pilot carriers (pilot tones) of the pilot sequence 54 directly into a data carrier sequence (the constellation data 52) along the frequency axis. (See specifically column 5, lines 31-40, column 6, lines 2-7, and Figure 5). Since a symbol contains a group of carriers located at different frequencies within a set frequency range at a given time frame, it is apparent that Figure 5 of Kleider illustrates an example of a symbol. The example of Figure 5 shows how pilot carriers (indicated with dashed lines) are inserted at different frequencies than data carriers (indicated with solid lines) across the transmission frequency range within the symbol. Kleider does not disclose or suggest the generation of a symbol in which all frequencies of the transmission frequency range will include only data carriers, since the disclosure of Kleider indicates that pilot sequence overhead is from 0.01% to

100%. Therefore, each symbol of Kleider will have at least one pilot carrier included therein.

On the other hand, the present invention recites an OFDM signal including at least one data symbol having only a plurality of subcarriers having data therein, and at least one pilot symbol including a plurality of subcarriers, at least one of the subcarriers having a frequency component predetermined in amplitude and phase, and being inserted either before or after one or more data symbols. Therefore, the present invention as recited in claim 1 has a pilot symbol inserted either before of after one or more data symbols, instead of inserting individual pilot carriers between data carriers along a frequency axis within a symbol as is disclosed in Kleider.

Further, claim 1 recites that at least one data symbol includes only a plurality of subcarriers having data therein. As discussed above, every one of the symbols disclosed in Kleider includes at least one pilot carrier. Therefore, none of the symbols of Kleider correspond to the at least one data symbol. (See column 3, lines 29-34).

As a result, Kleider fails to disclose or suggest the present invention as recited in claim 1.

As for claims 14, 19, 26 and 28-33 these claims are patentable over Kleider for the same reasons as set forth above in support of claim 1. That is, claims 14, 19, 26 and 28-33, like above discussed claim 1, recite, in part, an OFDM signal including at least one data symbol having only a plurality of subcarriers having data therein, and at least one pilot symbol including a plurality of subcarriers, at least one of the subcarriers having a frequency component predetermined in amplitude and phase, and being inserted either before or after one or more data symbols, which features are not disclosed or suggested in Kleider.

As for claim 7, in addition to being patentable over Kleider for the reasons set forth above in support of claim 1, claim 7 recites providing the OFDM signal with control information indicating how often and how many pilot symbols are inserted. Kleider also fails to disclose or suggest this feature of claim 7.

The section of Kleider relied upon in the rejection as disclosing the feature of claim 7 is column 6, lines 10-30. However, this section of Kleider discloses equations that can be used to determine the spacing of pilot tones across a frequency range. There

is no disclosure in this section of Kleider, or any other section of Kleider for that matter, of providing the OFDM signal with control information indicating how often and how many pilot symbols are inserted. As a result, Kleider also fails to disclose or suggest the present invention as recited in claim 7.

Claim 12 is also patentable over Kleider, since claim 12 recites an OFDM transmitter comprising a data symbol generator for generating an OFDM data symbol including a plurality of subcarriers for data for transmission, a pilot symbol generator for generating an OFDM pilot symbol including a plurality of subcarriers, and a symbol selector for switching between signals provided by the data symbol generator and the pilot symbol generator, so that the pilot symbol is inserted before or after one or more data symbols. Kleider fails to disclose or suggest a data symbol generator, a pilot symbol generator or a symbol selector as recited in claim 12.

As discussed above, Kleider discloses a system having a pilot sequence generator 18 that inserts pilot tones of a pilot sequence 54 into constellation data 52 for generating symbols. (See column 3, lines 6-67, column 5, lines 31-40, and Figures 1, 2 and 5). Each of the symbols created from the pilot sequence generator of Kleider has pilot tones located therein. Therefore, the pilot sequence generator 18 of Kleider necessarily fails to disclose or suggest either the pilot signal generator or the data symbol generator as recited in claim 12. Further, Kleider fails to disclose a symbol selector for switching between signals provided by the data symbol generator and the pilot symbol generator, so that the pilot symbol is inserted before or after one or more data symbols, since the pilot sequence generator 18 combines the pilot tones with the constellation data 52 at a carrier level and not a symbol level. As a result, Kleider fails to disclose or suggest the present invention as recited in claim 12.

Because of the above mentioned distinctions, it is believed clear that claims 1-33 are not anticipated by Kleider. Furthermore, it is submitted that the distinctions are such that a person having ordinary skill in the art at the time of invention would not have been motivated to modify Kleider or to make any combination of the references of record in such a manner as to result in, or otherwise render obvious, the present invention as recited in claims 1-33. Therefore, it is submitted that claims 1-33 are clearly allowable over the prior art of record.

In view of the above amendments and remarks, it is submitted that the present application is now in condition for allowance. The Examiner is invited to contact the undersigned by telephone if it is felt that there are issues remaining which must be resolved before allowance of the application.

Respectfully submitted,

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